# *CORYSTUS DYSASTEROIDES*, A TERTIARY HOLASTEROID ECHINOID FORMERLY KNOWN AS *DUNCANIASTER AUSTRALIAE*

by R. J. FOSTER* and G. M. PHILIP†

**Summary**

FOSTER, R. J., & PHILIP, G. M. (1976).—*Corystus dysasteroides*, a Tertiary holasteroid echinoid formerly known as *Duncaniaster australiae*. *Trans. R. Soc. S. Aust.* **100**(3), 113-116, 31 August 1976.

The type specimens of the nominal species *Rhynchopygus dysasteroides* Duncan 1877, *Holaster australiae* Duncan 1877, *Holaster difficilis* Duncan 1887 and *Galeraster australiae* Cotteau 1890 (which include the type species of *Corystus* Pomel 1883, *Galeraster* Cotteau 1890 and *Duncaniaster* Lambert 1896) are discussed and illustrated. All are included in one species correctly designated *Corystus dysasteroides* (Duncan).

## Introduction

Holasteroid echinoids are not abundantly represented in the diverse Tertiary echinoid fauna of southern Australia, but there is one common species which, for the last eighty years has been known as *Duncaniaster australiae* (Duncan). The purpose of this note is to review the complex nomenclatural history of the species and to decide on its correct designation. Also, photographs of the type material of four nominal species proposed by Duncan (1877, 1887) and Cotteau (1890) are published for the first time.

The species is known from the Tertiary coastal basins of southern Australia from Eucla Basin in the west to Torquay Embayment in the east, and from New Zealand. The earliest known Australian occurrence is in the Middle or early Late Eocene; it is present in the Wilson Bluff Limestone at the Bluff and in Abrakurrie Cave, and in the Tortachilla Limestone and equivalents of the St Vincent Basin. It makes its last Australian appearance in the late Early Miocene (uppermost Longfordian) Watacpoolan Limestone at Koonalunda in western Victoria. The species also occurs in the South Island of New Zealand; it appears first near the base of the Weka Pass Limestone in the Early Oligocene (questionable Whaingaroan), and last in the Gee Greensand in the Late Oligocene or Early Miocene (Waitakian-Otaian). More stratigraphic details are given in a separate paper (Foster and Philip, in press).

## Historical review

Duncan (1877, p. 49) described the species *Rhynchopygus dysasteroides* from Castle Cove, Victoria (Late Eocene Castle Cove Limestone) and (1877, p. 51) described a further species, *Holaster australiae* from the same locality. The holotype of *R. dysasteroides* is crushed, and it was presumably for this reason that Duncan regarded the specimen as a cassiduloid. Pomel (1883, p. 61) proposed the genus *Corystus* for *R. dysasteroides* because of its intercalary apical system. In his revision of the Australian echinoid fauna Duncan (1887, p. 421( provided a corrected woodcut of the apical system of the holotype of *H. australiae*. He recognised that he had misinterpreted the species *R. dysasteroides* and been mistaken about its affinities. As a consequence he renamed it *Holaster difficilis*. Pomel's work was not well known at the time and it is no doubt because of this Duncan made no mention of the genus *Corystus*.

Cotteau (1890, p. 548) described *Galeraster australiae* from Mount Gambier (Early Miocene Gambier Limestone) as a new genus and species, placing the genus *Galeraster* close to *Holaster*. Tate (1891, p. 276) first suggested that *H. difficilis* and *H. australiae* were the same species. In 1892 Bittner (p. 359) rejected the

* BHP Oil and Gas Division, Melbourne, Vic. 3000.

† Department of Geology and Geophysics, University of Sydney, N.S.W. 2006.

genus *Corystus*, noting Gregory's (1890, p. 490) reference to *H. difficilis* as an "unsatisfactory species". Also, in 1892 Tate published his strongly worded criticism of Bittner's paper but in regard to these species he followed Bittner, although he suggested that *Galeraster australiae* was an additional synonym of *Holaster australiae*.

Lambert (1893, p. 97) transferred *H. australiae* to Pomel's genus *Lampadocorys* but later (1896, p. 317) made it the type species of his new genus *Duncaniaster* which he placed close to *Stegaster*. Thus was created the widely used name *Duncaniaster australiae*. In 1903 Lambert (p. 32) grouped the genus with *Lampadocorys*, *Stegaster*, *Tholaster* and *Offaster* in his subfamily Echinocorynae.

Lambert & Thiery (1921, p. 332) recognised *Galeraster* as a valid genus in the Echinogalerinae, stating (1924, p. 408) that Tate was mistaken when he made *Galeraster australiae* a synonym of *Holaster australiae*. They (1921, p. 364) reinstated the species *Rhynchopygus dysasteroides*, and made *Corystus* Pomel a synonym of *Rhynchopygus* d'Orbigny. Last of all (1924, p. 408), they relegated *Duncaniaster* Lambert to a sub-genus of *Cibaster* Pomel.

H. L. Clark (1946), in his review "The Echinoderm Fauna of Australia" mentioned neither *Corystus* nor *Galeraster*. He maintained *Duncaniaster* as a separate genus (p. 361), but did not consider it far removed from *Cardiaster*; the only species he listed was *D. australiae* (Duncan). Mortensen (1948, p. 84) retained Cotteau's genus *Galeraster* in the family Echinoneidae Wright and close to *Pyrina*, but (p. 203) considered *Corystus* to be a synonym of *Cassidulus*. He confirmed (1950, p. 74) *Duncaniaster* in the Holasteridae close to *Cibaster*. Wagner & Durham (1966, pp. U445 U528) in the Treatise followed Mortensen in their placement of *Galeraster* and *Duncaniaster*, and *Corystus* was tentatively placed among the cassiduloids as a doubtful nominal genus.

## Type material

The holotype of *Rhynchopygus dysasteroides* is BM, E42418 (Fig. 2 C, E, F) and that of *Holaster australiae* is BM, E31067 (Fig. 2 A, B, D). Both are lodged in the British Museum (Natural History), and both were collected from the "No. 5 Upper Coralline Beds, Castle Cove, near Cape Otway" in Victoria. This is the old locality AW5 of Wilkinson (1865) in the Castle Cove Limestone, which Carter (1958, p. 21) refers to as his Foraminiferal Units 2 and 3. The echinoids are probably from the upper part of the formation in the latest Late Eocene.

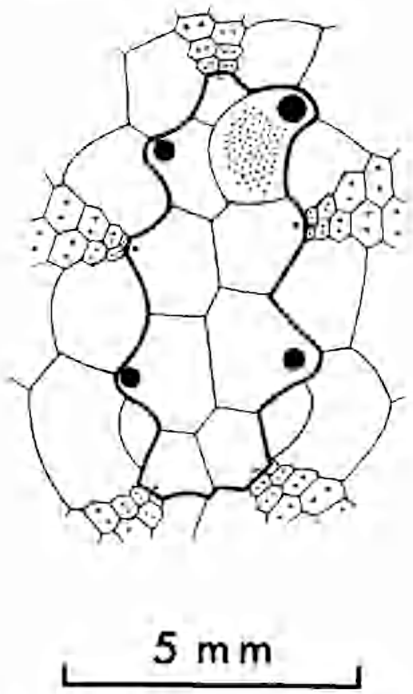


Fig. 1. Plating of apical system of holotype of *Holaster australiae* Duncan (BM E31067).

As indicated above, the type specimen of *R. dysasteroides* is badly crushed, although the adapical surface shows an holasteroid apical system, similar to that of *H. australiae* (Fig. 1). In both specimens the adoral surface is poorly preserved, and the plastronal plating is obscure. Because of the state of preservation, the presence or absence of a subanal fasciole could not be established.

The holotype of Cotteau's *Galeraster australiae* is an unnumbered specimen in the Ecole des Mines, Paris, in the Cotteau Collection (Fig. 2 G, H, I). Its locality is "Mount Gambier, Australia" and doubtless is from the Gambier Limestone. The type section in the sinkhole at Mt Gambier town is of Longfordian (Early Miocene) age, and Janjukian (Late Oligocene) outcrops are limited to restricted areas NW and SW of the town. The precise locality of Cotteau's type, and of the only other representatives of the genus from this formation (P20456 from the National Museum of Victoria and T267a from the Tate Collection labelled "*Holaster woodsii* Mt Gambier"), is

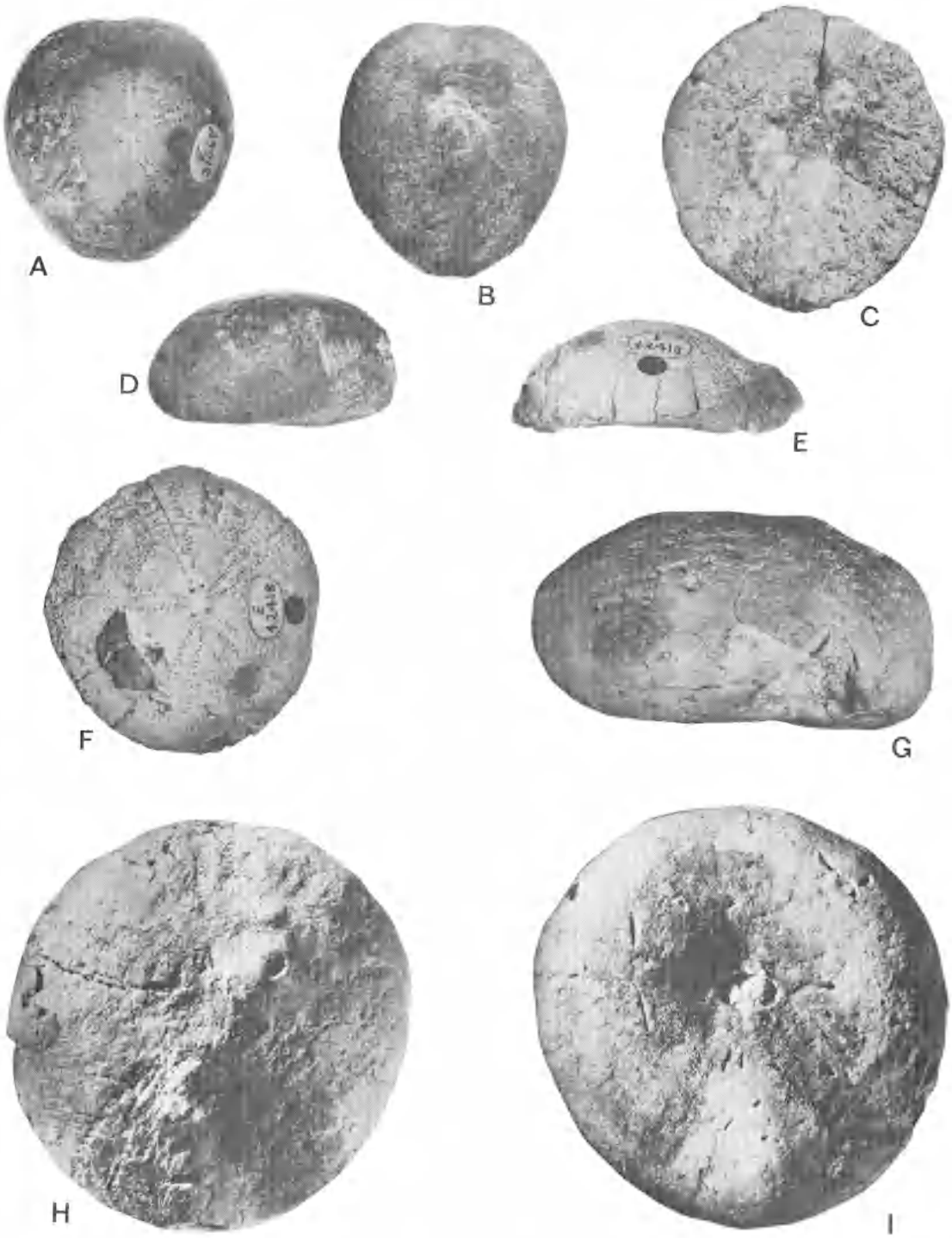


Fig. 2. All natural size. *A*, *B*, *D*. Adapical, adoral, and lateral views of holotype of *Holaster australiae* Duncan (BM E31067). *C*, *E*, *F*. Adoral, lateral and adapical views of holotype of *Rhynchopygus dysasteroides* Duncan (BM E42418). *G*, *H*, *I*. Lateral, adapical and adoral views of holotype of *Galeraster australiae* Cotteau.

not known. The general echinoid fauna presently available from the Gambier Limestone appears to have its closest affinities with that of the Longfordian Mannum Formation of the River Murray cliffs. In particular, T267a the only well-preserved specimen of *Corystus* from Mount Gambier was elsewhere (Foster & Philip, in press) compared statistically with the populations from a number of south-eastern Australian localities ranging from Late Eocene to Early Miocene, and its parameters correlated best with samples of populations from the Mannum Formation and the Longfordian portion of the Port Vincent Limestone. It is therefore concluded that the holotype is probably from the Early Miocene. Again the holotype is a poorly preserved specimen. It is worn and cracked and a number of borings occur in parts of the test. Surface detail is obscured by matrix and secondary calcite to the degree that even the paths of the ambulacra are difficult to trace. Preparation of the apical region of the specimen showed the widely separated oculars typical of an holasteroid apical system.

## Conclusions

Despite the unsatisfactory nature of the type material, we conclude that all specimens are conspecific. We base this conclusion on the large collections of the species available to us from various localities in south-eastern Australia. We here choose *dysasteroides* as the valid name for the species as it has page precedence over *australiae* which was introduced by Duncan in the same publication. Pomel's genus *Corystus* has priority over *Duncaniaster* Lambert. Thus the valid Linnean species is *Corystus dysasteroides* (Duncan).

In a further paper (Foster & Philip, in press) we present a statistical analysis of samples of *Corystus* populations ranging from Late Eocene to Early Miocene in age. This analysis is designed to depict the morphological trends apparent in the evolution of the species. We also have in preparation a taxonomic study of all the holasteroid echinoids known from the Tertiary rocks of Australia (including Western Australia) and New Zealand. In this latter article we will review the affinities of the genus *Corystus*.

## References


Bittner, A. (1892).—Uber Echiniden des Tertiärs von Australien. *Sitz. K. Akad. Wiss. Wien, (Math. Natur. Cl.)* **101**, 331-371.

Carter, A. N. (1958).—Tertiary Foraminifera from the Aire District, Victoria. *Bull. Geol. Surv. Vict.* **55**, 1-76.

Clark, H. L. (1946).—The Echinoderm Fauna of Australia. Its composition and origin. *Publ. Carnegie Inst. Wash.* **566**, 1-567.

Cotteau, G. H. (1890).—Echinides nouveaux ou peu connus. **2**(9) *Mem. Soc. Zool. France*, 537-550.

Duncan, P. M. (1877).—On the Echinodermata of the Australian Cainozoic (Tertiary) Deposits. *Quart. J. Geol. Soc. Lond.* **33**(1), 42-71.

Duncan, P. M. (1887).—A revision of the Echinoidea from the Australian Tertiaries. *Ibid.* **43**(3), 411-430.

Foster, R. J., & Philip, G. M. (in press).—Statistical analysis of the Tertiary holasteroid *Corystus dysasteroides* from Australasia. *Thalassia Jugosl.*

Gregory, J. W. (1890).—Some additions to the Australian Tertiary Echinoidea. *Geol. Mag.* **27**, 481-492.

Lambert, J. (1893).—Etudes morphologiques sur les plastron des spatangides. *Bull. Soc. Sci. hist. nat. l'Yonne* **47**, 55-98.

Lambert, J. (1896).—Note sur quelques Echinides crétacés de Madagascar. *Bull. Soc. Géol. France* **24**, 313-332.

Lambert, J. (1903).—Description des échinides crétacés de la Belgique. I. Etude monographique sur le genre *Echinocorys*. *Mém. Mus. Roy. d'Hist. Nat. Belg.* **2**, 1-151.

Lambert, J., & Thiery, P. (1909-1925).—"Essai de Nomenclature raisonnée des Echinides" 1-9 (Libraire Ferriére: Chaumont).

Mortensen, T. (1948).—"A monograph of the Echinoidea" IV (1) Holectypoida, Cassiduloida (C. A. Reitzel: Copenhagen).

Mortensen, T. (1950).—Idem V (1) Spatangoida I.

Pomel, N. A. (1883).—"Classification méthodique et genera des échinides vivants et fossiles" (Adolphe Jourdan: Alger).

Tate, R. (1891).—A bibliography and revised list of the Described Echinoids of the Australian Eocene, with descriptions of some new species. *Trans. Proc. R. Soc. S. Aust.* **14**, 270-282.

Tate, R. (1892).—Critical remarks on A. Bittner's "Echiniden des Tertiars von Australien". *Ibid.* **15**(2), 190-194.

Wagner, C. D., & Durham, J. W. (1966).—Holectypoids, Holasteroids. *In:* Moore, R. C. (Ed.) "Treatise on invertebrate palaeontology" U3(2), U440-U450 & U523-U543.

Wilkinson, C. S. (1865).—Report on the Cape Otway Country (from Parl. Papers, 1864-1865). *Rept. Geol. Surv. Vict.* 1863-1864, 21-28.